PATENT APPLICATION

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**
**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re application of

Masayasu KOYAMA, et al.

Appln. No.: 09/304,841

Confirmation No.: 1233

Filed: May 5, 1999

Docket No: Q54287

Group Art Unit: 1772

Examiner: Marc A. Patterson

## SUBMISSION OF APPELLANT'S BRIEF ON APPEAL

Commissioner for Patents
Washington, D.C. 20231

Sir:

Submitted herewith please find an original and two copies of Appellant's Brief on Appeal. A check for the statutory fee of $320.00 is attached. The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account. A duplicate copy of this paper is attached.

Respectfully submitted,

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Date: March 5, 2004

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For: OXYGEN-ABSORBING RESIN COMPOSITION AND PACKAGING CONTAINER, PACKAGING MATERIAL, CAP OR LINER MATERIAL HAVING OXYGEN ABSORBABILITY

# APPELLANTS' BRIEF ON APPEAL

## I. REAL PARTY IN INTEREST

The real party of interest is assignee TOYO SEIKAN KAISHA, LTD., by virtue of an assignment executed by the Appellants on June 22, 1999, and submitted for recordation to the assignment Branch of the U.S. Patent and Trademark Office on July 9, 1999. The assignment is recorded at Reel 010083, Frame 0316.

## II. RELATED APPEALS AND INTERFERENCES

To the best of the knowledge and belief of the Appellants, the assignee and the undersigned, there are no other appeals or interferences before the Board of Appeals and Interferences that will directly effect or be effected by the Board's decision in the present appeal.

## III. STATUS OF CLAIMS

This is an appeal from the Examiner's final rejection of claims 1, 4, 6, 8, 10-15 and 20 dated September 9, 2003. Claims 1, 4 and 8 were amended and claim 20 was added in an Amendment Under 37 C.F.R. § 1.111 filed June 24, 2003. Claim 5 was canceled in an Amendment under 37 C.F.R. § 1.111 filed June 28, 2002. Claims 7 and 9 were canceled and claim 10 was amended in an Amendment under 37 C.F.R. §1.111 filed November 6, 2001. Claims 2, 3 and 16-19 were canceled and claim 11 was amended in an Amendment under 37 C.F.R. § 1.111 filed April 20, 2001.

Claims 1, 4, 6, 8, 10-15 and 20 on appeal here are set forth in their entirety in Appendix A attached to this Brief on Appeal.

## IV. STATUS OF AMENDMENTS

No amendments have been filed subsequent to the final rejection dated September 9, 2003.

## V. SUMMARY OF THE INVENTION

In a first embodiment as recited in independent claim 1, Appellants' claimed invention relates to a thermoplastic resin composition comprising a blend of a plurality of thermoplastic resins and/or elastomers, and oxygen absorbing agent particles dispersed in the thermoplastic resins and/or the elastomers (page 8, line 34 - page 9, line 3). The plurality of the thermoplastic resins and/or the elastomers are incompatible with each other (page 4, lines 19-28 and page 16, lines 9-13). Furthermore, the oxygen absorbing agent particles comprise a reducing iron powder and a layer of an oxidation promoter or a catalyst which sticks to the surfaces of the reducing iron powder (page 5, lines 9-12), the oxygen absorbent agent particles have an average particle diameter of 10 to 50 μm as measured by a laser scattering method (page 5, lines 22-24), and have a flat or spindle-like shape (page 5, lines 20-22).

In a preferred embodiment as recited in claim 4 depending from claim 1, either the incompatible thermoplastic resins and/or the elastomers are propylene polymers (A) and the other ones are ethylene polymers (B), the blend thereof having a weight ratio (A:B) of from 100:1 to 1:1 (page 4, line 33 - page 5, line 3).

In yet another preferred embodiment as recited in claim 6 depending from claim 1, the oxygen absorbing agent is contained in an amount of 1 to 200% by weight based on the blend (page 5, lines 6-8).

In yet another preferred embodiment, as recited in claim 8 depending from claim 1, the oxygen absorbing agent particles have the oxidation promoter or the catalyst which is present in an amount of 0.1 to 5% by weight of the reducing iron powder (page 11, lines 33-35), and have a specific surface area of at least $0.5m^2/g$ and an apparent density of not larger than 2.2 g/cc (page 12, lines 11-15).

In yet another preferred embodiment as recited in claim 10 depending from claim 1, the oxygen absorbing agent particle is obtained by dry milling a reducing a iron powder and a powder of an oxidation promoter or a catalyst (page 13, lines 26-28).

In yet another preferred embodiment as recited in claim 20 depending from claim 1, the oxygen absorbing agent particles have an aspect ratio (short axis/long axis) of 0.6 or below, which are present in an amount of at least 50%, and have a compression degree of at least 20% (page 12, line 30 - page 13, line 3).

In a second embodiment as recited in independent claim 11, Appellants' claimed invention relates to an oxygen-absorbing agent comprising oxygen-absorbing agent particles which comprise a reducing iron powder and an oxidation-promoting agent or a catalyst firmly adhered to surfaces of the reducing iron powder (page 11, lines 19-24 and original claim 11). The oxygen-absorbing agent has a specific surface area of not smaller than $0.5\ m^2/g$ and an apparent density of not larger than 2.2 g/cc (page 12, lines 11-15). The oxidation-promoting agent of the catalyst is present in an amount of from 0.1 to 5% by weight per the reducing iron powder (page 11, line 33 - page 12, line 2). The oxygen absorbing agent particles have an average particle diameter of 10 to 50 μm as measured by a laser scattering method and an aspect

ratio (short axis size/long axis size ) of 0.6 or below being present in an amount of at least 50% and is a flat or a spindle-shaped particle having a compression degree of at least 20% (page 12, line 30 - page 13, line 3).

In a third embodiment as recited in claim 12, Appellants' claimed invention relates to an oxygen-absorbing resin composition obtained by blending 1 to 200 parts by weight of an oxygen-absorbing agent according to claim 11 into 100 parts by weight of a thermoplastic resin (page 19, lines 5-9 and original claim 12).

In a fourth embodiment as recited in claim 13, Appellants' claimed invention relates to an oxygen-absorbing multilayer plastic container molded from a laminated body obtained by laminating a thermoplastic resin layer having no oxygen absorbing agent compounded on both sides of a layer composed of the oxygen-absorbing resin composition according to claim 1 (page 19, lines 25-29; page 20, lines 10-18; page 29, lines 2-4; Figs. 5 and 6; and original claim 13).

In a fifth embodiment as recited in claim 14, Appellants claimed invention relates to an oxygen-absorbing multilayer plastic cap which is molded from a laminated body obtained by laminating a thermoplastic resin containing no oxygen-absorbing agent on both sides of a layer composed of the oxygen-absorbing resin composition described in claim 1 (page 7, lines 25-29; page 19, lines 25-29; page 25, lines 15-18; page 20, lines 10-18; page 20, lines 25-35; Example 13, and specifically page 55, lines 8-17; Figs. 2 and 3; and original claim 14.

In a sixth embodiment as recited in claim 15, Appellants' claimed invention relates to a liner material for caps which contains a layer composed of the oxygen-absorbing resin

composition according to claim 1 (page 26, line 16 - page 27, line 33, and specifically page 26, lines 17-31; Fig. 4 and original claim 15).

## VI. ISSUES

A first issue for appeal is whether claims 1, 4, 6, 10, 13-15 and 20 were properly rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,542,557 to Koyama et al.

A second issue for appeal is whether claims 8, 11 and 12 were properly rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,542,557 to Koyama et al in view of Japanese Patent No. 59085804 (JP '084).

## VII. GROUPING OF CLAIMS

The rejected claims do not stand or fall together. Appellants submit that claim 4 (which recites that either the incompatible thermoplastic resins and/or the elastomers are propylene polymers (A) and the other ones are ethylene polymers (B), the blend thereof having a weight ratio (A:B) of from 100:1 to 1:1), claim 10 (which recites that the oxygen absorbing agent particle is obtained by dry milling a reducing iron powder and a powder of an oxidation promoter right catalyst) and claim 20 (which recites that the oxygen absorbing agent particles have an aspect ratio of 0.6 or below, which are present in the amount of at least 50%, and have a compression degree of at least 20%) are separately patentable from claims 1, 6 and 13-15, and set forth additional limitations which are not taught or suggested in the prior art.

## VIII. ARGUMENT

### (A) Rejection of Claims 1, 4, 6, 10, 13-15 and 20 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,542,557 to Koyama et al

#### (i) Reasons for the Rejection

The Examiner considered Koyama et al as disclosing a thermoplastic resin composition containing an oxygen absorbing agent and a blend of two resins which are incompatible with each other; one resin being a propylene polymer and the other resin being an ethylene polymer; the oxygen absorbing agent comprising oxygen absorbing agent particles comprising a reducing iron powder and a layer of an oxidation promoter which sticks to the surface of the powder; the particles having an average diameter of less than 50 $\mu$m.

Although acknowledging that Koyama et al fails to disclose flat particles (claim 1), the Examiner considered that it would have been obvious for one of ordinary skill in the art at the time of the invention to have provided for flat particles for the reason that "the modification would have involved a mere change in shape". Furthermore, although acknowledging that Koyama et al fails to disclose particles having an aspect ratio of 0.6 and a compression degree of at least 20% (claim 20), the Examiner considered that it would have been obvious to vary these parameters through routine optimization depending on the desired end use of the product.

#### (ii) Appellants' Position

A characteristic feature of the present invention resides in the specific combination of a blend of resins that are incompatible with each other and an oxygen absorbing agent having a flat or spindle-like shape. When employed as a component layer of, e.g., a plastic container, plastic cap or liner material, the thermoplastic resin composition of the invention alleviates stress

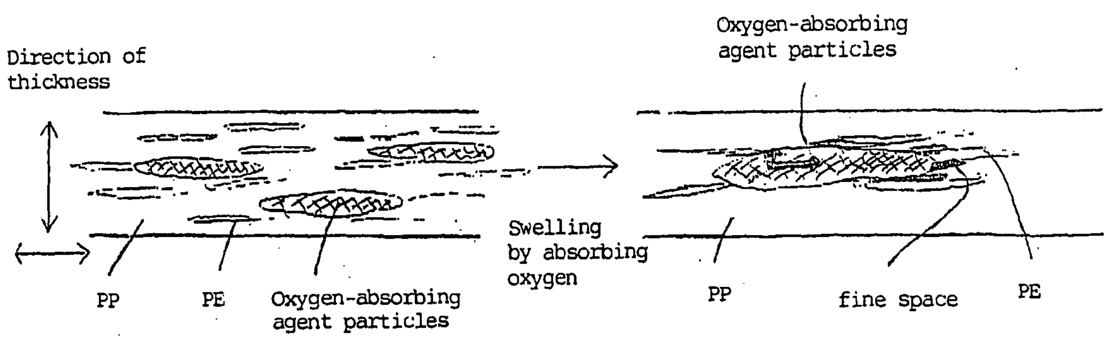
produced by volume expansion (due to oxidation reaction of the oxygen absorbing agent within the resin composition), to thereby provide excellent preservability of the contents (page 1, lines 14-22 of the specification). Particularly, the present invention solves the problem of the prior art in which, after storing for an extended period of time, particles comprising the oxygen-absorbing agent or the oxidized product thereof grow or increase in volume due to reaction with oxygen, to thereby penetrate through the thermoplastic resin protection layer and break the protection layer (page 3, lines 16-24 of the specification).

In more detail, the oxygen absorbing agent particles swell when absorbing oxygen. In the case of a resin matrix of a single resin or a resin matrix of a plurality of resins which are compatible with one another, cracks occur in the resin matrix and rust elutes onto the surfaces. In order to solve the above problems according to the present invention, oxygen absorbing particles of a flat or spindle-like shape are selected to suppress swelling in the thickness direction. Additionally, a plurality of resins incompatible with each other are blended to obtain a resin matrix such that one resin is dispersed in the other resin, thereby relaxing stress produced by expansion of the oxygen absorbing agent particles among the resins.

The technical concept of the present invention, based upon the combination of an incompatible matrix resin and oxygen-absorbing agent particles having a "flat or spindle" shape, is explained in further detail as follows.

As shown in the following schematic diagram, when melt-drawn, a blend of a plurality of thermoplastic resins (PP and PE in the diagram) which are substantially incompatible assumes a distribution structure in which the components are distributed in layers which are laminated one

upon the other in the thickness direction and extending in the plane direction. This distribution structure has been blended with oxygen-absorbing particles having a flat or spindle shape. When the oxygen-absorbing agent particles expand in volume due to the oxygen absorbing reaction, the amount of swelling increases in the plane direction, but the amount of swelling decreases in the thickness direction. Stress produced in the plane direction due to the swelling is relaxed by peeling at the interfaces of the matrix distribution structure and by fine spaces (gaps) formed at the interfaces, and does not reach the surface. As a result, the inventive structure prevents the resin layer from being broken down.




Cracks occur along the PE layer to relax the force produced by swelling. Because cracks occur along the PE layer due to weak adhering strength on the interface of the PE layer in the PP layer.

Turning to the cited prior art, the Examiner considered Koyama et al as teaching:

(1) a thermoplastic resin composition containing an oxygen absorbing agent;

(2) a blend of two resins which are incompatible with each other;

(3) one resin is a propylene polymer and the other resin is an ethylene polymer;

(4) the oxygen absorbing agent comprises oxygen absorbing agent particles comprising a reducing iron powder and a layer of an oxidation promoter which sticks to the surfaces of the powder; and

(5) the particles have an average diameter of less than 50 μm;

but does not teach:

6) flat particles, or

7) particles having an aspect ratio of 0.6 and a compression degree of at least 20% (claim 20).

Although the Examiner focused on individual aspects of the claimed invention, the statute requires more. Namely, 35 U.S.C. § 103(a) includes the requirement that the claimed invention as a whole would have been not obvious at the time the invention was made. In this regard, Koyama et al does not teach or suggest the technical concept or advantages, as discussed above, of blending an incompatible matrix resin with oxygen-absorbing agent particles having a "flat or spindle" shape.

As for (6), the Examiner cited to Koyama et al at col. 10, lines 3-8 as disclosing an oxygen absorbing agent of a granular, and therefore three-dimensional form. Based on this teaching of the prior art, the Examiner considered that it would have been obvious to modify the shape of the granular particles of Koyama et al so as to provide flat (or spindle-like) particles, such modification allegedly involving a mere change in shape, citing *In re Dailey*, 149 USPQ 47 (CCPA 1966). *In re Dailey* held that the configuration of a claimed disposable plastic nursing container was a matter of choice which a person of ordinary skill in the art would have found

obvious, absent persuasive evidence that the particular configuration of the claimed container was significant. See also MPEP § 2144.04.

The Examiner's reliance on *In re* Dailey is misplaced, because this decision is not applicable to the chemical arts which involves a high degree of unpredictability.

Furthermore, Koyama et al could have easily specified the shape of the oxygen absorbing agent, but did not. Koyama et al teaches a granular, three-dimensional form entirely different from the claimed flat or spindle-like shape, and the Examiner has not cited anything in the prior art which would teach the desirability of modifying the granular particles so as to assume a flat or spindle-like shape.

The significance of the claimed oxygen absorbing agent particles having a flat or spindle-like shape, in combination with a blend of a plurality of thermoplastic resins and/or elastomers which are incompatible with each other, is described in Appellants' specification at page 6, line 9 - page 7, line 13; at page 12, line 30 - page 13, line 23 and in the Examples. Namely, the oxygen-absorbing agent particles desirably have a flat shape or a spindle shape, so as to prevent swelling in the thickness direction and the occurrence of cracks. There is nothing that would lead one of ordinary skill in the art to select an oxygen absorbing agent having a flat or spindle-like shape from the description in Koyama et al relating to "granular form" or average particle size (col. 10, lines 26-28), let alone in specific combination with a blend of resins that are incompatible with each other. That is, the above action and effect of the present invention can be obtained only by the specific combination of a blend of resins that are incompatible with each

other and oxygen absorbing agent particles having a flat or spindle-like shape, which has not at all been recognized by Koyama et al.

More specifically, Example 7 of the present specification employed oxygen-absorbing agent particles of a "flat or spindle" shape having an aspect ratio of 0.25 to 0.6 at a distribution ratio of not less than 60% and having a compression degree of 39%. In contrast, Comparative Example 7-1 was blended with oxygen-absorbing agent particles having a large aspect ratio (not less than 60% of the particles had an aspect ratio of not smaller than 0.6), which are close to spheres. The appearance of the resulting product was compared to that of Example 7, from which it is seen that the use of oxygen-absorbing agent particles having a flat or spindle-shape is critical to achieving the effects of the invention.

As for (2), Koyama et al (column 10, lines 55-62) merely describes dispersing a hydrophilic substance in the thermoplastic resin, which hydrophilic substance promotes the oxygen absorption reaction of the oxygen absorbing agent. Contrary to the Examiner's suggestion, this is not a description of a blend of incompatible thermoplastic resins and/or elastomers as required by present claim 1. Even in the present invention an oxidation promoting agent comprising a hydrophilic resin can be blended separately from the matrix resin (i.e., the plurality of the thermoplastic resin and/or the elastomers that are incompatible with each other). That is, the ethylene oxide modified product of Koyama et al does not represent the blend of thermoplastic resins and/or elastomers that are incompatible with each other.

The polyethylene oxide modified product described in Koyama et al at column 10, line 55 - column 11, line 2 noted by the Examiner is surely a thermoplastic resin. This polyethylene

oxide modified product, however, is an oxidation-promoting agent different from the matrix resin which does not take part in the oxidation reaction as referred to the present invention.

A polyvinyl alcohol also described in Koyama et al together with the polyethylene oxide modified product is a thermoplastic resin and is also described in the present specification (page 5, lines 14-18) as being an oxidation-promoting agent. In the present invention, the resin matrix can also be blended with the oxidation-promoting agent. The oxidation-promoting agent is distinct from the thermoplastic resin which is a matrix that can be blended with the oxygen-absorbing agent of the present invention. It does not mean that the oxidation-promoting agent comprising the thermoplastic resin which is simply dispersed in the matrix, can readily be used as the thermoplastic resin and/or the elastomer in the substantially incompatible blended system of the present invention. Further, in the present specification, the thermoplastic resin and/or the elastomer concretely exemplified as matrix resins in the specification are all hydrophobic (page 16, line 22 - page 18, line 5). From this aspect, the hydrophilic compounds such as polyethylene oxide modified product are distinct from the matrix resin of the present invention.

Furthermore, the above-noted polyethylene oxide modified product has been listed as an oxidation-promoting agent together with inorganic substances such as sodium chloride and the like, from which it is clear that the polyethylene oxide modified product is simply for feeding a water component to the oxygen-absorbing agent. Namely, Koyama et al does not at all teach the technical concept of the present invention of combining a blend of incompatible resins with the oxygen-absorbing agent.

Koyama et al at column 8, line 55 - column 11, line 21 simply teaches a layer which is not blended with the oxygen-absorbing agent, i.e., a resin used in a portion corresponding to 17 in Fig. 3 of Koyama et al. Even if an ethylene polymer and polypropylene polymer are described in this passage, column 8 has nothing to do with the thermoplastic resin/elastomer which serves as the matrix resin blended with the oxygen-absorbing agent of the present invention.

Further, in reference to Koyama et al at column 8 (also at column 12, lines 53-67), there is no description or teaching that the resins described therein can be blended. Even if some of the resins described therein are used in combination, it cannot be said that they are all incompatible. Instead, some of them are substantially compatible (e.g., various kinds of polyethylenes). That is, the description of Koyama et al at columns 8 and 12 also does not teach the present invention.

As for (3), Koyama et al (column 8, lines 18-39) relied upon for the propylene polymer simply describes a resin used for a sealing portion (column 8, lines 18-20) which does not contain the oxygen absorbing agent. There is no description of addition of an oxygen absorbing agent in this portion of Koyama et al. Further, the passages (column 10, line 63-67, column 11, lines 1-2) relied upon by the Examiner relating to the ethylene polymer simply describe polyethylene oxide modified products as hydrophilic promoters, but do not describe resins that can be used as a resin matrix.

Koyama et al exemplifies olefin resins such as polyethylene and polypropylene (column 12, lines 53-67) as resins to be blended with additives such as an oxygen absorbing agent and the like. However, Koyama et al does not at all describe or suggest the use of a plurality of resins

which are blended together and selected so as to be incompatible with one another. That is, according to Koyama et al, the oxygen absorbing agent is only one of many additives that can be incorporated into a resin, and does not recognize the idea of selecting a blend of incompatible resins when further adding an oxygen absorbing agent. Thus, it is respectfully submitted that the Examiner's position constitutes hindsight reconstruction of Appellants' invention. One of ordinary skill in reading Koyama et al could never arrive at the present invention without further consulting the teachings in Appellants' specification.

**(iii) Separate Patentability of Claim 20**

As claimed in claim 20, the oxygen absorbing agent particles have an aspect ratio of 0.6 or below, are present in an amount of at least 50%, and have a compression degree of at least 20%.

The Examiner considered that the aspect ratio and the compression ratio as claimed in claim 20 is easily derived from the particle diameter as described in (5) above. However, the aspect ratio and the compression degree cannot be exclusively derived from the average particle size. Namely, the aspect ratio and the compression degree specified by the present invention are subject to vary not only depending upon the size of the oxygen-absorbing agent particles, but also upon the shape thereof, and cannot be exclusively determined from the average particle size.[1] For example, in Comparative Example 7-1 at page 46 of the specification, the reducing

[1] The relationship between aspect ratio and compression degree is as follows. Namely, as represented by the ratio (b/a) of the length a of the longest axis of the particle and the length b of a short axis at right angles with a long axis at the central point, the aspect ratio is a value expressing the shape of a flat surface of particular two axis of a solid particle. Without taking another axis (c-axis) into consideration, the aspect ratio represents the flatness of the particle in cross-sectional shape. On the

...(footnote continued)

iron powder described therein had a particle diameter of 40 μm but an aspect ratio in which more than 60% of the particles exhibited an apparent aspect ratio of not smaller than 0.6. That is, average particle diameter says nothing about aspect ratio or compression degree.

Oxygen-absorbing agent particles having the claimed aspect ratio, distribution and compression degree are the oxygen-absorbing agent particles described in Example 5 at pages 43-44 of the specification. See page 46, lines 19-21 (Example 7) which describes that these particles have an aspect ratio of 0.25 to 0.60, distributed at a ratio of not less than 60% and having a compression degree of 39%. Example 9-2 describes a blend of a polypropylene and a low-density polyethylene at a ratio of 9:1, that is blended with the above-described oxygen-absorbing agent particles, exhibiting excellent appearance and oxygen-absorbing property.

**(iv) Separate Patentability of Claim 4**

Concerning claim 4, the Examiner cited col. 11, lines 25-26 as describing that "the ethylene polymer is present in the blend at greater than 1% by weight". However, this passage simply specifies the amount of the hydrophilic substance used as a promoter, does not teach selection of propylene polymers (A) and ethylene polymers (B) as incompatible thermoplastic resins and/or elastomers, or a weight ratio (A:B) thereof of from 100:1 to 1:1.

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other hand, the compression degree specifies the properties of the particle by also taking the c-axis into consideration in addition to the particular sectional shape of the particle. Namely, the compression degree relates to how closely (without gaps) the particles can be filled in a relationship among particles. Therefore, when evaluating the compression degree, the shape and the size of the whole particle inclusive of its size in the c-axis direction is considered in addition to the cross-section defined by the particular two-dimensional sizes of the particle.

Furthermore, the "polyethylene oxide modified product" described at column 10, lines 63-65 and relied upon by the Examiner is an <u>ether</u> -($CH_2$-$CH_2$-O)- outside the scope of the claimed ethylene polymer (B) of claim 4.

Moreover, although Koyama et al discloses that polypropylene (PP) and polyethylene (PE) may be used as matrix resins, Koyama et al teaches neither blending these resins so as to be incompatible with one another nor that they can or should be blended.

**(v) Separate Patentability of Claim 10**

As for claim 10, the effect of dry milling is seen from the comparison of Example 7 and Comparative Example 7-1 at pages 46-48 of the specification.

Namely, in wet type milling, the surfaces of the iron powder tend to be oxidized or swollen due to the presence of moisture and, hence, the properties and the shape thereof are subject to be changed, making it difficult to obtain a homogeneous oxygen absorbing agent. As shown in Table 5 at page 48 of the specification, the sample of Comparative Example 7-1 containing wet-milled reducing iron powder resulted in a container allowing a considerably increased oxygen concentration as little as one week after retort sterilization, as compared to the container of Example 7 made with a dry-milled reducing iron powder. More particularly, the comparison of Example 7 and Comparative Example 7-1 of the present specification demonstrates that a materially different and unobvious product is obtained by dry milling a reducing iron powder and a powder of an oxidation promoter or catalyst. There is nothing in the prior art which teaches the desirability or obviousness of dry milling resulting in an unobvious product.

As provided by MPEP §2113:

> The structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art, especially where the product can only be defined by the process steps by which the product is made, or where the manufacturing processing steps would be expected to impart distinctive structural characteristics to the final product.

**(B) Rejection of claims 8, 11 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Koyama et al in view of Japanese Patent 59085804**

**(i) Reasons for Rejection**

Although acknowledging that Koyama et al does not disclose an absorbing agent having a specific surface area of at least 0.5 $m^2/g$ and an apparent density of not larger than 2.2 $g/\mu$, the Examiner relied on Japanese Patent No. 59085804 as teaching iron oxide for chemical reduction having an apparent density of 2.2 g/cc.

**(ii) Appellants' Position**

The apparent density according to Japanese Patent No. 59085804 is that of the iron oxide, whereas the apparent density specified in the present claims is that of the oxygen absorbing agent which comprises oxygen absorbing agent particles of a reducing iron powder and a layer of an oxidation promoter or a catalyst which sticks to the surfaces of the reducing iron powder. It is therefore clear that quite different values are contemplated and exhibited by the two.

In the present invention, the promoter and the catalyst are adhered onto the surfaces of the reducing iron powder, and the apparent density is not the same as that of the reducing iron powder itself. One of ordinary skill could not have readily arrived at the claimed invention, even assuming that the value of apparent density of the iron oxide is described in JP '804.

The Examiner further considered JP '804 as teaching that a smaller apparent density and larger specific surface area are desirable, and, hence, that one of ordinary skill could have easily arrived at the claimed specific surface area. However, there is no rule that if ether the surface area or the apparent density is determined, then, the other one is inevitably determined. In fact, a variety of probabilities exists, and it is never easy to select an optimum from among these parameters.

That is, reducing iron powders exist having various densities, and the relationship between surface area and apparent density cannot be determined exclusively.

In the first full paragraph at page 8 of the final Office Action dated September 9, 2003, the Examiner concluded that it would have been obvious to have provided for an apparent density of not larger than 2.2 g/cc in Koyama et al in order to use an iron oxide having different shapes as taught by JP '804.

Appellants respectfully disagree with the Examiner's reasoning.

First, although JP '804 mentions application to chemical reduction, such chemical reduction can come in a multitude of forms, whereas the present invention is specific to a blend of thermoplastic resins and/or elastomers that are incompatible with each other and oxygen absorbing agent particles dispersed therein and having a specific shape. Secondly, JP '804 has nothing to do with oxygen absorbing agent particles having a flat or spindle-like shape, let alone the specific combination thereof with the blend of thermoplastic resins and/or elastomers that are incompatible with each other. Rather, JP '804 teaches that iron powder "of any shape" may be processed by the technique described therein to readily oxidize, melt and then reduce in a

reducing atmosphere <u>to form a spheroid shape</u> of apparent density of 0.5-3.0 g/cc with large specific surface area. That is, the combination of JP '804, which teaches spheroidal particles with Koyama et al (which teaches granular particles having a certain average particle size) can never result in the invention which specifically requires oxygen absorbing agent particles having a flat or spindle-like shape.

Appellants further incorporate herein the argument above with respect to the rejection of claims 1, 4, 6, 10, 13-15 and 20 of Koyama et al alone, and specifically with regard to claim 20. There is nothing in Koyama et al which teaches or suggests the use of oxygen absorbing agent particles having a flat or spindle-shape, or having an aspect ratio of 0.6 or below present in an amount of at least 50%, or a compression degree of at least 20%.

## IX. CONCLUSION

In view of the foregoing argument, it is respectfully submitted that the rejection of claims 1, 4, 6, 10, 13-15 and 20 over Koyama et al and the rejection of claims 8, 11 and 12 over Koyama et al in view of JP '804 are in error.

Appellants therefore respectfully request the members of the Board to reverse the rejection of all the appealed claims and to find each of the claims allowable as defining subject matter which would not have been obvious over the applied references.

Respectfully submitted,

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Date: March 5, 2004

## APPENDIX - A

## CLAIMS ON APPEAL

1. A thermoplastic resin composition comprising a blend of a plurality of thermoplastic resins and/or elastomers, and oxygen absorbing agent particles dispersed in the thermoplastic resins and/or the elastomers, wherein:

the plurality of the thermoplastic resins and/or the elastomers are incompatible with each other; and

the oxygen absorbing agent particles comprise a reducing iron powder and a layer of an oxidation promoter or a catalyst which sticks to the surfaces of the reducing iron powder, the oxygen absorbent agent particles having an average particle diameter of 10 to 50 μm as measured by a laser scattering method, and having a flat or spindle-like shape.

Claims 2 and 3 (canceled).

4. An oxygen-absorbing resin composition according to claim 1, wherein either the incompatible thermoplastic resins and/or the elastomers are propylene polymers (A) and the other ones are ethylene polymers (B), the blend thereof having a weight ration (A:B) of from 100:1 to 1:1.

Claims 5 (canceled).

6. An oxygen-absorbing resin composition according to claim 1 wherein the oxygen absorbing agent is contained in an amount of 1 to 200% by weight based on the blend.

Claim 7 (canceled).

8. An oxygen-absorbing resin composition according to claim 1, wherein the oxygen absorbing agent particles have the oxidation promoter or the catalyst which is present in an amount of 0.1 to 5% by weight of the reducing iron powder, and have a specific surface area of at least 0.5 $m^2/g$ and an apparent density of not larger than 2.2 g/cc.

Claim 9. (canceled).

10. An oxygen-absorbing resin composition according to claim 1, wherein the oxygen absorbing agent particle is obtained by dry milling a reducing iron powder and a powder of an oxidation promoter or a catalyst.

11. An oxygen-absorbing agent comprising oxygen-absorbing agent particles which comprise a reducing iron powder and an oxidation-promoting agent or a catalyst firmly adhered to surfaces of said reducing iron powder, and which has a specific surface area of not smaller than 0.5 $m^2/g$ and an apparent density of not larger than 2.2 g/cc, and in which the oxidation-promoting agent or the catalyst is present in an amount of from 0.1 to 5% by weight per the reducing iron powder, wherein the oxygen absorbing agent particles have an average particle diameter of 10 to 50 $\mu m$ as measured by a laser scattering method and an aspect ratio (short axis

size/long axis size) of 0.6 or below being present in an amount of at least 50% and is a flat or spindle-shaped particle having a compression degree of at least 20%.

12. An oxygen-absorbing resin composition obtained by blending 1 to 200 parts by weight of an oxygen-absorbing agent according to claim 11 into 100 parts by weight of a thermoplastic resin.

13. An oxygen-absorbing multilayer plastic container molded from a laminated body obtained by laminating a thermoplastic resin layer having no oxygen absorbing agent compounded on both sides of a layer composed of the oxygen-absorbing resin composition according to claim 1.

14. An oxygen-absorbing multilayer plastic cap which is molded from a laminated body obtained by laminating a thermoplastic resin containing no oxygen-absorbing agent on both sides of a layer composed of the oxygen-absorbing resin composition described in claim 1.

15. A liner material for caps which contains a layer composed of the oxygen-absorbing resin composition according to claim 1.

Claims 16-19 (canceled).

20. An oxygen-absorbing resin composition according to claim 1, wherein the oxygen absorbing agent particles have an aspect ratio (short axis/long axis) of 0.6 or below, which are being present in an amount of at least 50%, and have a compression degree of at least 20%.